

**CALIFORNIA COASTAL COMMISSION**

NORTH CENTRAL COAST DISTRICT  
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**Th-8b**

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**STAFF REPORT: REGULAR CALENDAR**

**APPLICATION FILE NO.:** 2-02-001

**APPLICANTS:** Eugene Metz, Carol Cebe, David Sherbon,  
Stephen Bowman, and Richard Carcione.

**PROJECT DESCRIPTION:** Removal and replacement of a 410-foot section of a  
bulkhead on Seadrift Lagoon.

**PROJECT LOCATION:** Three, 5, 9, 11, and 17 Dipsea Road, Stinson Beach, Marin  
County  
APNs 195-090-32, -30, -06, -33, and -34

**SUBSTANTIVE FILE  
DOCUMENTS:** See Appendix A

**1.0 EXECUTIVE SUMMARY**

The applicants propose to remove 410 feet of wooden bulkhead on the eastern end of Seadrift Lagoon and replace it with a sheet bulkhead consisting of interlocking, PVC sheet pile armor. The new bulkhead would be located landward of the existing bulkhead. The PVC piles would be 14 to 18 feet long and driven 9 to 13 feet into the sand bottom of the lagoon. Commission staff recommends approval of the permit with conditions to mitigate impacts related to water quality.

**2.0 STAFF RECOMMENDATION**

The staff recommends conditional approval of Coastal Development Permit Application No. 2-02-001.

**Motion:** *I move that the Commission approve Coastal Development Permit Application No. 2-02-001, subject to the conditions specified below.*

**Staff Recommendation of Approval**

The staff recommends a YES vote. To pass the motion, a majority of the Commissioners present is required. Approval of the motion will result in the adoption of the following resolution and findings.

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### Resolution

The Coastal Commission hereby **grants** permit No. 2-02-001, subject to the conditions below, for the proposed development on the grounds that (1) the development is in conformity with the provisions of Chapter 3 of the California Coastal Act of 1976 and (2) there are no feasible alternatives or feasible mitigation measures other than those specified in this permit that would substantially lessen any significant adverse impact that the activity may have on the environment.

### 2.1 Standard Conditions

1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittees or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.
2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.
3. Interpretation. Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.
4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.
5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittees to bind all future owners and possessors of the subject property to the terms and conditions.

### 2.2 Special Conditions

1. Bulkhead Removal

If the Executive Director determines that based on newly available information, including but not limited to published scientific research, or a determination made by a regulatory agency, such as the U.S. Environmental Protection Agency, California Regional Water Quality Control Board, or California Department of Fish and Game, that chemicals contained in the approved bulkhead have the potential to cause significant adverse impacts to the biological productivity and the quality of coastal waters resulting in an inability to maintain optimum populations of marine organisms, or cause significant adverse impacts to human health, the permittees shall within 60 days of such determination submit an application to the Commission for a coastal development permit amendment to address such significant adverse impacts, which may require removal of the approved bulkhead and/or remediation of impacts attributable to the approved bulkhead.

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### 2. Disposal of Removed Debris.

All materials and debris from the existing bulkhead shall be removed from the lagoon in their entirety and shall be legally disposed of either outside of the Coastal Zone or inside the Coastal Zone in accordance with an approved coastal development permit.

### 3. Sediment Control.

***Prior to commencement of any construction***, the eastern tide gate at Seadrift Lagoon shall be closed and remain closed for the duration of construction and for no less than four hours following the completion of construction each day activities authorized under this permit are carried out.

### 4. Chemical Control

Wood treatment products and any other chemicals shall not enter waters of Seadrift Lagoon under any circumstances. In-field treatment of wood shall occur on land only and is prohibited within 50 feet of lagoon waters. Treatment products shall be applied with a brush rather than sprayed to minimize spread of chemicals, and shall consist only of products approved by the EPA for use in the field.

### 5. Bulkhead Maintenance

- a. Prior to issuance of the permit, the applicants shall submit a Monitoring Plan, acceptable to the Executive Director. The permittees, and their successors in interest shall be responsible for carrying out all provisions of the Monitoring Plan for as long as the bulkhead remains. The monitoring plan, at a minimum, shall provide for:
  - (1) Regular inspections by a licensed engineer. These inspections shall be performed at least every 4 years for the first 12 years after the bulkhead has been installed, and at least every other year thereafter.
  - (2) The inspections shall examine the exposed subaerial and submarine portions of the bulkhead (to the mud line) for signs of weakness or possible failure, including, but not limited to cracking, bending, splitting, splintering, or flaking. All weak or potential failure areas should be marked on an as-built plan of the bulkhead, and there should be photographs and text to explain the nature and extent of each weakness.
  - (3) Inspection reports shall be prepared and conveyed to the Executive Director within 30 days of the inspection work. These reports shall provide information on and photographs from the date of the inspection, the name and qualifications of the person performing the inspection, and an overall assessment of the continued stability of the bulkhead. If the inspection identifies any areas where the bulkhead has been damaged, the permittees shall be responsible for applying for any necessary permits, and performing the work required in compliance with and in accordance with such permits.
- b. In the event that any sections of the bulkhead are damaged or flaking, the permittees shall notify the Commission within 10 days; and in such event, within 30 days of such notification, submit to the Commission a complete application for any coastal development permit amendment necessary for the repair or replacement of the bulkhead.

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### 6. Assumption of Risk, Waiver of Liability, and Indemnity Agreement.

By acceptance of this permit, the applicants acknowledge and agree (i) that the site may be subject to seismic, geologic, and geotechnical hazards; (ii) to assume the risks to the applicants and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agent, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

### 7. Deed Restriction

**PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicants shall submit to the Executive Director for review and approval documentation demonstrating that the applicants have executed and recorded against the parcel(s) governed by this permit a deed restriction, in a form and content acceptable to the Executive Director: (1) indicating that, pursuant to this permit, the California Coastal Commission has authorized development on the subject property, subject to terms and conditions that restrict the use and enjoyment of that property; and (2) imposing the Special Conditions of this permit as covenants, conditions and restrictions on the use and enjoyment of the Property. The deed restriction shall include a legal description of the entire parcel or parcels governed by this permit. The deed restriction shall also indicate that, in the event of an extinguishment or termination of the deed restriction for any reason, the terms and conditions of this permit shall continue to restrict the use and enjoyment of the subject property so long as either this permit or the development it authorizes, or any part, modification, or amendment thereof, remains in existence on or with respect to the subject property.

## 3.0 FINDINGS AND DECLARATIONS

The Commission hereby finds and declares as follows:

### 3.1 Project Location

The project site, located on the filled portion of the sand spit between Dipsea Road and Seadrift Lagoon in Stinson Beach, Marin County, spans across five separate but contiguous parcels that are on the easternmost end of the lagoon (three, 5, 9, 11, and 17 Dipsea Road) and is within the privately maintained, gated community of Seadrift (Exhibit 1, Location Map & Exhibit 2, Vicinity Map). The applicants' parcels are each developed with single-family residences, are approximately 130 feet long and 60 to 130 feet wide, and extend 12 feet into the interior of the lagoon (Exhibit 3, Assessor Parcel Map). The properties are bordered on the north and south by existing residences, the east by Dipsea Road, and the west by Seadrift Lagoon. Seadrift Lagoon is an artificially created interior lagoon located between Dipsea and Seadrift Roads. As with all of the properties located adjacent to Seadrift Lagoon, an existing wooden bulkhead separates the lagoon from the landward portion of the properties. The bulkhead, installed around 1967, is approximately three feet high and consists of creosote treated wooden posts and lagging (Exhibit 4, Site Photograph). Extensive damage and

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deterioration has occurred within this section of the Seadrift bulkhead. In some areas the wood has deteriorated to such an extent or been washed away that sediment from the parcels is eroding into the lagoon.

### 3.2 Project Description

The applicants propose to remove the section of the existing bulkhead in front of their properties, which totals approximately 410 linear feet and replace it with a PVC sheet pile bulkhead. The replacement bulkhead would consist of interlocking, PVC sheet pile armor (specifically, a product called ShoreGuard™) and would be placed landward of the existing wooden bulkhead (Exhibit 5, Site Plan and Typical Bulkhead Cross Section). The PVC piles would be 14-18 feet long and driven 9 to 13 feet into the sand bottom of Seadrift Lagoon using a vibrating hammer on a crane which would be located on a barge in the lagoon. Before the proposed bulkhead is installed, the existing bulkhead would be removed using chains attached to the crane that would grasp the wooden pilings and whaler boards and pull the materials out of the sand bottom. The removed pieces would be placed on another barge floating on Seadrift Lagoon to be disposed of off site (Exhibit 6, Bulkhead Installation Plan).

### 3.3 Coastal Act Issues

#### 3.3.1 Water Quality

Coastal Act Section 30230 states:

*Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Coastal Act Section 30231 states:

*The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Seadrift Lagoon is hydrologically connected with Bolinas Lagoon via two tidal gates located at the west and east ends of Seadrift Lagoon. The tidal gates are used by the Seadrift Association to maintain a certain water level in Seadrift Lagoon. When the gates are open, water from Bolinas Lagoon flows into Seadrift Lagoon via the western tide gate and water from Seadrift Lagoon flows into Bolinas Lagoon through the eastern tide gate. This eastern gate is located approximately one parcel over from the project site.

Bolinas Lagoon is within the Gulf of the Farallones National Marine Sanctuary, one of four national marine sanctuaries in California and one of thirteen in the nation. The Sanctuary was designated in 1981 to protect and manage the 1,255 square miles encompassing the Gulf of the

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Farallones, Bodega Bay, Tomales Bay, Drakes Bay, Bolinas Bay, Estero San Antonio, Estero de Americano, Duxbury Reef, and Bolinas Lagoon. The approximately 2.2-square-mile (1,400-acre) Bolinas Lagoon contains environmentally sensitive habitat, including wetland and mudflats. Bolinas Lagoon provides an important haul-out and birthing site for harbor seals. In addition, benthic invertebrates and fish in the lagoon support a great diversity and abundance of wintering and migratory shorebirds, waterfowl, gulls, and other water-associated birds (Marin County LCP 1981). Bolinas lagoon is the only designated “Wetland of International Significance” on the Pacific Flyway as determined by the Convention on Wetlands of International Importance in 1998, and was recognized particularly for its waterfowl habitat. Approximately 245 species of birds have been identified at the Lagoon and its surrounding watershed. Twenty-three of these species are considered rare, threatened, or endangered. Shorebirds and waterbirds such as the brown pelican, snowy plover, dunlin, great blue heron, black crowned night heron, willet, sandpiper, and greater sand plover have been observed on the lagoon. Heron and egret are known to nest in the lagoon. Of the fifty or so estuaries that have formed along the Pacific Coast, Bolinas Lagoon is one of only 13 that sustains large numbers of migratory shorebirds. Furthermore, the Bolinas Lagoon Management Plan prepared by Marin County in 1996 also identified three species each of amphibians and mammals that frequent Bolinas Lagoon as rare, threatened or endangered (Bolinas Lagoon Ecosystem Restoration 2001). Marin County designates Bolinas Lagoon as a County Nature Preserve. The U.S. Army Corps of Engineers found that Bolinas Lagoon is part of a larger natural habitat complex that is part of or adjoins the Sanctuary, encompassing the Pt. Reyes National Seashore, Golden Gate National Recreation Area, Central California Coast Biosphere Preserve, Mt. Tamalpais State Park, and the Audubon Canyon Ranch Bird Sanctuary (USACOE 1997).

Coastal Act Section 30230 requires that marine resources be maintained, enhanced, and where feasible, restored and provides special protection to areas and species of special biological or economic significance. Coastal Act Section 30231 further requires that the biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams. The Commission considers Bolinas Lagoon to be a unique and important coastal wetland and finds that any development proposed within the connected Seadrift Lagoon must be undertaken to avoid impacts that would significantly degrade the biological productivity and quality of these connected coastal waters and wetlands. Furthermore, Seadrift community members use Seadrift Lagoon for recreational swimming and non-motorized boating. Thus, it is important that the proposed project protect human health of recreational users of these waters consistent with Section 30231.

### **3.3.1.1 Polyvinyl Chloride (PVC) Water Quality Impacts**

Commission staff has received comments related to concerns of the environmental and health impacts of the manufacturing and disposal of PVC. However, since neither manufacturing nor disposal of PVC is proposed under CDP Application 2-02-01, these issues are not before the Commission. Disposal of PVC or any other construction materials related to the proposed development within the Coastal Zone would require a coastal development permit, which would

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provide for Commission review of potential impacts of PVC disposal consistent with Chapter 3 of the Coastal Act.

In addition to concerns related to the production and disposal of PVC, Commission staff has received comments on potential water quality and human health impacts related to the use of PVC in Seadrift Lagoon, which include the following:

- The proposed PVC sheet pile would leach and outgas toxic compounds into the marine environment that may cause significant adverse impacts to marine wildlife and the aquatic environment;
- Vinyl chloride monomer, trace component of PVC, would be released into the environment and cause impacts to human health; and
- The proposed PVC bulkhead would release dioxin if burned.<sup>1</sup>

### 3.3.1.1(a) PVC Leachates

PVC is comprised of chlorine, carbon, and hydrogen. To create PVC, mineral oil, natural gas and sodium chloride (salt) are manufactured into ethylene and chlorine, which are synthesized into vinyl chloride monomers (VCM) that are then polymerized to polyvinyl chloride (PVC). Once the PVC is created, additives are combined with the PVC to give the finished product desired qualities such as flexibility, strength, and color.

Individuals are concerned that the additives contained in the proposed PVC sheet pile would leach into Seadrift Lagoon and cause significant adverse impacts to human health, marine wildlife, and the aquatic environment. The comments received by Commission staff focused on two additives: (1) plasticizers, which are used to make PVC flexible and (2) stabilizers, which are used to extend the life of the PVC when it is exposed to heat or ultraviolet light and pigments are added for color. Specifically, the stabilizers and plasticizers of concern include the following:

Plasticizers	Stabilizers
Phthalates	Lead
Bisphenol A	Cadmium
Alkylphenols	Organotins
Alkylphenol Polyethoxlanol	Derivatives of alkylphenol phosphates

The proposed bulkhead would consist of a rigid PVC. Thus, it is logical to conclude that the proposed material does not contain plasticizers. Nevertheless, to ensure that this is the case, Commission staff contacted the manufacturer regarding the above listed plasticizers and was told that the PVC used in ShoreGuard™ does not contain any of the above listed plasticizers, nor does it contain the following stabilizers: lead, cadmium, and derivatives of alkylphenol phosphates (Kantola, pers. comm.) (Wisner 2002). Thus, the use of the aforementioned stabilizers and plasticizers in PVC is not before the Commission for review of consistency with

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<sup>1</sup> Dioxin is a by-product whenever chlorine gas is used or chlorine-based organic chemicals are burned or processed under reactive conditions.

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the Chapter 3 policies of the Coastal Act as part of Coastal Development Permit Application No. 2-02-001.

The ShoreGuard™ material does contain organotin stabilizer compounds. Organotins are compounds which contain at least one bond between tin and carbon. There are three major types of tin stabilizers, which are distinguished by their respective alkyl groups: methyl, butyl, and octyl.

Clear distinctions must also be drawn between the tri-organotin compounds (which have three tin-carbon bonds) used as biocides and pesticides, and the mono- and di-organotin compounds, with one and two tin-carbon bonds, respectively, used in stabilizer, catalyst, and glass coating applications. Biocides are, by definition, toxic and tri-organotin compounds that can be a potent endocrine disruptor causing major damage to marine wildlife populations.<sup>2</sup> However, Tri-organotin compounds such as tributyltin (TBT) are not used as PVC stabilizers. Mono- and di-organotins, on the other hand, are much less toxic. In fact, certain mono- and di-organotins have been approved as PVC stabilizers for food contact throughout the world (State of California, Department of Housing and Community Development 1998).

Many of the comments on the project submitted raised concerns with the use of TBT. TBT proved to be a highly effective biocide in preventing the attachment and growth of fouling organisms such as barnacles and tube worms on the hulls of vessels. For this reason, it was widely used in the 1960s and 1970s as a paint additive in antifouling coatings on boats. TBT was initially believed to be toxic only to fouling organisms on the painted surface and the not an environmental risk. However, TBT was later found to cause imposex in mollusks as well as other adverse impacts to aquatic wildlife. In 1988, the United States passed the Organotin Antifouling Paint Control Act, which restricts the use of TBT-based marine antifouling paints to ships greater than 25 meters in length or those with aluminum hulls.

The comments submitted stated that the mono- and di-butyltin compounds used in PVC are contaminated with TBT. This is not the case. Mono- and di-butyltins can exist as PVC stabilizers themselves or as degradation products of TBT. As explained previously, TBT, a tri-organotin, is used either as a biocide or pesticide, and is therefore not a part of the PVC product proposed for use. According to the manufacturer, the organotin stabilizer compound used in the ShoreGuard™ material is at less than 1.0 percent of the chemical make-up of the PVC and is a 50/50 mixture of dimethyltin  $[(CH_3)_2Sn(SCH_2COOC_8H_{17})_2]$  and monomethyltin  $[(CH_3)Sn(SCH_2COOC_8H_{17})_3]$  (Kantola 2002). It is therefore logical to conclude that neither mono-butyltins nor di-butyltins would be released to the environment either as TBT breakdown products or as a result of leaching stabilizer because TBT is not a part of the PVC product proposed for use. Since mono-butyltins, di-butyltins, and TBTs are not present in the proposed PVC material, there is no risk that they would leach into the marine environment as a result of the proposed development.

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<sup>2</sup> Endocrine disruptor is an exogenous agent that interferes with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body which are responsible for the maintenance of homeostasis reproduction, development and/or behavior. Research is being conducted on the relationship between breast cancer and endocrine disruptors.



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In addition to concerns raised with TBT, dibutyltins, and monobutyltins, Commission staff received general comments about the effects of organotins on human health and the marine environment, which include the following: (1) heavy metals such as organotins, resist environmental breakdown and have become global pollutants; (2) the immunotoxicity of some organotins in animals has raised concerns about organotin effects in humans; and (3) organotins can suppress immunity, disrupt the endocrine system, cause birth defects, damage liver, bionduct and pancreas, and may pose a threat to aquatic organisms.

Studies published in the scientific literature show that low concentrations of organotins leach into water from rigid PVC pipes (State of California, Department of Housing and Community Development 1998; Sadiki and Williams 1999). Thus, it is likely that some organotin compounds would leach from the proposed PVC bulkhead when exposed to marine waters. As such, the Commission must evaluate whether the proposed development would be carried out in a manner that would sustain the biological productivity and quality of coastal waters adequate to maintain healthy populations of all species of marine organisms and for the protection of human health as required by Coastal Act Sections 30230 and 30231.

The likelihood that some organotins would leach from the material does not necessarily render the proposed development inconsistent with Coastal Act Sections 30230 and 30231. Rather, the issue is whether leaching of organotins from the proposed bulkhead would cause the biological productivity and quality of coastal waters to become inadequate to maintain healthy populations of all species of marine organisms and/or to be hazardous to human health.

The Commission finds that the leaching of organotins into Seadrift Lagoon as a result of the proposed development would not significantly affect the biological productivity and quality of coastal waters because:

- Organotins are not generally persistent in the environment as they are broken down rapidly through microbial activity;
- The mono- and di-organotins contained in PVC and the eventual breakdown product of inorganic tin are much less toxic than tri-organotins;
- The concentration of organotin compounds released to the lagoon would be substantially below the levels determined to be safe for drinking water and the levels shown to be toxic to aquatic organisms; and
- Extensive studies have found PVC products containing organotin compounds do not pose a significant risk to human health in such applications as drinking water pipes (State of California, Department of Housing and Community Development 1998).

Studies have shown that biological degradation of methyl-, butyl- and octyl-tin compounds occur in the aquatic environment. Specifically for mono- and di-methyltins (the stabilizers used in the proposed bulkhead), their half lives, in the absence of methylating organisms to reverse the demethylation process, are estimated to be less than a few months (Maguire 1991). Other researchers have offered a half-life range of a few days to several weeks (ORTEP). These studies indicate that organotins do break down.

Acute toxicity data for organotin compounds are also available. A Canadian study has shown that concentrations of monomethyltin that inhibit 50% of growth (i.e., EC<sub>50</sub>) of bacteria, yeasts,

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*D. magna* and some algae are generally greater than 1 mg/L. Some diatoms, however, are inhibited at concentrations as low as 0.08 mg/L. Nevertheless, the figure of 0.08 mg/L is still 67 times higher than the highest concentration of monomethyltin observed in water. Similarly, EC<sub>50</sub> for dimethyltin is estimated at greater than 0.07 mg/L, and usually greater than 1 mg/L, depending on the target organisms. Again, the figure of 0.07 mg/L is about 150 times higher than the highest concentration of dimethyltin observed in water. It therefore appears that the mono- and di-methyltin compounds would not have acute toxic effects to aquatic organisms. It should be noted that this study had investigated findings from other researchers and monitoring results from harbors, marinas, and shipping channels in Canada and elsewhere. Similar toxicity results appear to hold true for mono- and di- butyltins and octyltins as well. Other studies support these conclusions (Maguire 1991; Walsh et.al. 1985; ORTEP).

In terms of potential chronic effects of organotins on the aquatic environment, a 1993-1994 study of water across Canada concluded that the 13 non-TBT organotin species found appeared to pose no acute or chronic hazards to fresh water or marine organisms (Chau et.al. 1997).

The State's Department of Housing and Community Development (HCD) published a *Draft EIR for CPVC Pipe Use for Potable Water Piping in Residential Buildings* in 1998. The draft EIR examined the potential human and environmental impacts associated with the use of CPVC for potable water piping. CPVC consists of long chains of vinyl chloride, to which chlorine is added. PVC is essentially the parent polymer of CPVC. CPVC is more resistant to chemical attack than PVC and does not soften until it reaches a higher temperature, and thus would be more suitable for use in potable water piping.

CPVC and PVC have been widely used for a variety of things in the existing environment. Some examples include toys, food storage plastics, water filter bodies and garden sprinkler pipe and irrigation pipe commonly used in landscape irrigation and production agriculture. The draft EIR recommended that CPVC be used for potable water piping in residential buildings as well. It had already been approved for that particular use in all of the other 49 states, and many foreign countries.

The National Sanitation Foundation (NSF), a not-for-profit, non-governmental organization, involved in standards development, product certification, education, and risk-management for public health and safety has tested and certified many of the common uses of PVC products. The Maximum Contaminant Levels (MCLs) established by USEPA and Cal DHS form the basis for NSF Standards for Drinking Water System Components Health Effects. The MCLs are levels at which no adverse human health impacts would be expected throughout a lifetime of exposure. The MCLs also incorporate a margin of safety. NSF generally uses 10% of the MCL, which provides an additional margin of safety. For contaminants for which there is no MCL, a risk estimate [Maximum Allowable Level (MAL)] is calculated by NSF, following a standard risk assessment protocol developed in concert with the USEPA.

In laboratory experiments, organotins have been detected in water which has been in contact with CPVC pipe and fittings. Standards for organotins in drinking water have been established by NSF using the MAL approach: Short Term Exposure Level (STEL) of 100 µg/L and Maximum Drinking Water Level (MDWL) of 20 µg/L. The draft EIR stated that no studies

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found had organotin levels above either of these standards. NSF's extraction tests also yielded organotin concentrations lower than the established standards. It should be noted that these extraction tests were performed at elevated temperatures to actively induce leaching, and so the actual concentrations of organotins in drinking water would be lower than suggested by the test data. The draft EIR concluded that higher concentrations of organotins tended to be a transitory effect of new installations and were not significant. And, leaching occurred more readily in hot water than in cold. The report arrived at a similar "insignificant" determination for environmental impacts as a result of CPVC use (State of California, Department of Housing and Community Development 1998).

Based on the literature reviewed, the Commission also finds that the evidence does not support a determination that the PVC bulkhead proposed for use in the aquatic environment would be hazardous to human or ecological health. Organotins, the primary leachates of concern, constitute 1% of the PVC chemical make-up. Studies have shown that even though the leaching of organotins does occur, the leachates tend to break down quickly and do not accumulate to levels approaching the reported effective concentrations for the biological indicators used. Similarly, laboratory extraction tests, employing stringent conditions, on CPVC pipes have yielded leached organotin concentrations below even the conservative human health-based criteria. Therefore, even though organotins would leach from the proposed bulkhead, especially immediately upon installation, mitigating factors in the environment such as the constant flushing and dilution provided by the surrounding water and the fact that the bulkhead would not be subject to temperature extremes as the CPVC pipes used in the extraction tests help ensure that the resultant organotin concentrations in the receiving water would be low and not pose significant adverse impacts to either human or ecological health.

Therefore, the Commission finds that based on the current information available, the leaching of dimethyltin and monomethyltin from the proposed bulkhead would not cause significant adverse impacts to the biological productivity and quality of coastal waters consistent with Coastal Act Sections 30230 and 30231.

Although the Commission finds that the current scientific research demonstrates that significant adverse impacts to coastal waters would not result from organotin leachates, the potential exists that scientific research methods could advance and identify unanticipated harmful effects that would result in this development being inconsistent with Coastal Act Sections 30230 and 30231. Therefore, the Commission imposes **Special Condition 1**, which requires that if the Executive Director determines that based on newly available information, including but not limited to published scientific research, or a determination made by a regulatory agency, such as the U.S. Environmental Protection Agency, California Regional Water Quality Control Board, or California Department of Fish and Game, that chemicals contained in the approved bulkhead have the potential to: (1) cause significant adverse impacts to the biological productivity and the quality of coastal waters resulting in an inability to maintain optimum populations of marine organisms, or (2) cause significant adverse impacts to human health, the permittees shall within 60 days of such determination submit an application to the Commission for a coastal development permit amendment to address such significant adverse impacts, which may require removal of the approved bulkhead and/or remediation of impacts attributable to the approved bulkhead.

**3.3.1.1(b) Health Impacts of Vinyl Chloride Monomers (VCM)**

The concern has also been raised that vinyl chloride monomer (VCM), a trace component of PVC, would be released into the environment from the proposed bulkhead and cause impacts to human health. Public comments included information on VCM from a company called TurnerToys™, which states, “VCM does not, theoretically, occur in PVC polymer produced with perfect quality control. However, this highly toxic and carcinogenic compound has been found to be a trace component of PVC. There have been reports of VCM detected in drinking water that has been standing for a period of time in PVC water pipe.” TurnerToys™ also states, “the main risk of VCM, however, has been found to be primarily to workers in plants producing PVC or producing PVC resin from the VCM monomer; and also to people living close to such plants”(TurnerToys™). As stated above, the production of PVC is not part of the proposed development and therefore, not before the Commission for review of consistency with the Coastal Act.

However, the information from TurnerToys™ also states that “exposure hazard to users of PVC products is not theoretically inherent in the process, but in fact occurs due to inevitable lapses in production quality control and housekeeping” (TurnerToys™). Literature reviewed by staff indicates that exposure of the general public to VCM is considered very low, unless one lives near a PVC plant. These exposures are a result of direct emissions and effluents from the plastic industries. Average daily intake of vinyl chloride through inhalation by local residents ranges from trace amounts to 2,100 µg/day. The average daily intake of vinyl chloride by the remainder of the population, on the other hand, is minimal and essentially zero (NIH, NIEHS, NTP).

Sustained exposure to high concentrations of vinyl chloride during the manufacturing process causes angiosarcoma of the liver, with inhalation being the most likely route of exposure. Comments received by staff also included case studies on angiosarcoma of the hand for workers routinely exposed to pipes and cement containing PVC (Mohler et. al. 1998). In these latter cases, the individuals were exposed to years of routine dermal contact with the pipes and pipe shavings.

Any potential health risk posed by vinyl chloride would depend on both the chemical’s toxicity and human’s exposure to it. Residents and/or swimmers of Seadrift Lagoon would in no way be subject to the same levels of vinyl chloride exposure as PVC workers. The amount of vinyl chloride uptake by individuals (used along with toxicity to estimate chronic health risks, both carcinogenic and non-carcinogenic) would depend primarily on three factors: (1) chemical concentration in the media that comes in contact with the receptors (i.e., air and water); (2) amount of media that is uptaken or comes in contact with the receptors; and (3) frequency and duration of uptake or contact. The PVC workers mentioned in the examples given either inhaled air with persistently high concentration of vinyl chloride in an environment with limited circulation or handled PVC pipes, exposing their hands to direct skin contact with PVC materials. It can further be assumed that these workers were exposed to vinyl chloride for several hours per day and all the work days in a year, and that kind of media contact was sustained for years of their lives.

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In contrast, the amount of residual VCM on the proposed PVC bulkhead would be relatively small to begin with and would decrease over time. Based on the compound's volatility and low solubility, any VCMs released would most likely end up in the atmosphere and disperse, leaving an insignificant vinyl chloride concentration in the water. The water concentration would be further tempered by dilution with the large volume of water available. Vinyl chloride concentration in the air immediately above and around the proposed bulkhead would be low as well due to the very well-circulated environment and certainly nowhere near the air concentration in a manufacturing facility. It is also safe to assume that Seadrift Lagoon residents and swimmers of the Lagoon would not experience the same level of continuous close contact with media containing vinyl chloride like in a work environment. The duration and frequency of vinyl chloride-polluted air uptake or water contact certainly would not approach several hours per day, 240 days per year (approximate number of work days per year), and several years during a lifetime. This would be true for both residents taking a leisurely walk near the bulkhead or swimmers in the Lagoon.

In conclusion, based on the available information, the Commission finds that any vinyl chloride released from the proposed bulkhead would not result in either the frequency or level of exposure that have been shown to be harmful to human health.

### **3.3.1.1(c) PVC and Dioxins**

Another issue raised by the public is the hazards associated with fire and the burning of PVC. When chlorine-based organic chemicals are burned or produced under reactive conditions, dioxins are formed. Dioxins have been characterized by EPA as likely to be human carcinogens and are anticipated to increase the risk of cancer at background levels of exposure (USEPA PBT). As noted in the public comments received by the Commission, the United States is a signatory to the Persistent Organic Pollutants (POP) Treaty, which bans or severely restricts a group of 12 pesticides and industrial chemicals including dioxins. In addition, when vinyl burns, hydrochloric acid is released. Hydrochloric acid can cause severe burns to skin, eyes, and lungs. If the proposed bulkhead were to catch fire while in the Seadrift Lagoon, it would potentially produce both dioxins and hydrochloric acid, releasing them into the air, and into the water, which would result in significant adverse impacts to the biological productivity and the quality of coastal waters, inconsistent with Coastal Act Section 30231. However, a report prepared by the Ministry of the Environment Denmark, titled *Environmental Aspects of PVC*, stated that the fire performance properties differ from rigid to flexible PVC and that rigid PVC is difficult to ignite and burns only with continuous addition of heat from another source (MED 1995). The proposed material is not only a rigid PVC, but would also be located primarily in water and buried in the sediment of the lagoon. Therefore, there is not significant risk that the proposed bulkhead would catch fire and release dioxins and hydrochloric acid into the air and water.

### **3.3.1.1(d) Additional PVC concerns**

In addition to the four main issues discussed above, Commission staff received various articles related to the health effects of chemical pollutants on humans and wildlife. An article titled, *Body of Evidence: The effects of chlorine on human health*, discusses in-depth the health effects of organochlorines on humans and wildlife (Allsopp et. al. 1995). Organochlorines are chemicals that have at least one chlorine-carbon bond in their structure. Potential health impacts include

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reproductive and developmental effects, effects on the nervous system, immune system and the liver, and cancer. The article includes discussion on the many impacts of dioxins, an organochlorine by-product. As previously mentioned, dioxin is produced when chlorine-based organic chemicals are burned or produced under reactive conditions. In order for dioxins to be released into the environment from the proposed development, the PVC sheet piles would need to be burned. As discussed in Section 3.3.1.1(c), the risk of the proposed development catching fire is assumed to be minimal. Therefore, exposure of humans and wildlife to dioxins by the proposed development is unlikely.

In addition to written comments and articles, Commission staff reviewed two video documentaries that were submitted, titled *Blue Vinyl* and *Bill Moyers "Trade Secrets,"* which discuss issues related to PVC. While the videos address issues related to health impacts of PVC manufacturing, use, and disposal, neither documentaries address nor evaluated the use of PVC as a shoreline protection material in a marine environment and whether such a use would impact the biological productivity and the quality of coastal waters.

Commission staff also received a copy of the Marin County Board of Supervisors Resolution No. 99-168, which encourages the elimination of dioxin emissions and promotes the use of PVC-free plastics. Even though the resolution discourages the use of PVC in Marin County, it does not prevent the Commission from approving the use of PVC as proposed because the resolution is not the standard of review in this case. The standard of review that the Commission must apply to the project is the Chapter 3 policies of the Coastal Act.

Concerned individuals also stated that there are safer alternatives than the proposed material. However, unless PVC is shown to present an unmitigated significant adverse impact to coastal resources inconsistent with the provisions of the Coastal Act, the question of whether PVC is the safest feasible alternative does not raise an issue under the Coastal Act. Coastal Act Sections 30230 and 30231 only require that the proposed development maintain, enhance, and where feasible, restore marine resources and that development not adversely impact the biological productivity and quality of coastal waters. Similar to the question of safer alternatives, is the issue of the percentage of recycled PVC contained in the proposed material. Whether the proposed PVC material is produced from 100% post-consumer waste is not an issue under the Coastal Act unless the proportion of recycled versus virgin PVC contained in the sheet pile were shown to cause significant adverse impacts to biological productivity and quality of coastal waters.

### 3.3.1.2 Construction and copper sulfate related water quality impacts

The proposed project would support the goals of Sections 30320 and 30231 because it would remove a portion of an existing creosote treated wooden bulkhead. Creosote, a chemical used to prevent the deterioration of wood by wood-boring organisms, is obtained by the distillation of coal tar and is primarily made up of a mixture of chemicals called polycyclic aromatic hydrocarbons (PAHs). PAHs can potentially leach out of the bulkhead and into the water column where they can be absorbed by fish and other aquatic organisms with potentially adverse consequences. The applicants propose to replace creosote treated timber bulkhead with ShoreGuard PVC sheet pile armor.

The proposed development would also enhance the water quality of Seadrift Lagoon because it would stop the erosion of sediments from the applicants' parcels into the lagoon. At present, the

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section of bulkhead in front of the applicants' residences has deteriorated in some areas to such an extent that there is no separation between the soil and the water. This sediment has the potential to continue to erode into the lagoon. Replacing the bulkhead would prevent further erosion of the affects properties.

The proposed development would result in overall improvement to water quality and biological productivity through the removal of creosote treated wood and prevention of erosion; however, if creosote treated wooden debris, or other materials were introduced into Seadrift Lagoon during the bulkhead removal and installation process, it may impact the water quality and biological productivity in the project area, inconsistent with Section 30231. Therefore, **Special Condition 2** requires all materials and debris to be removed from the lagoon, and requires disposal of all materials outside of the Coastal Zone unless authorized within the Coastal Zone under an approved coastal development permit.

In addition, Seadrift Lagoon is contaminated with copper sulfate. For 15 to 20 years, ending in 1986, copper sulfate was used to manage algae growth and blooms in Seadrift Lagoon. Although this practice has been stopped, contaminants are still present within the sediment. The U.S. Army Corps of Engineers conducted a study of the copper sulfate levels in the both Seadrift and Bolinas Lagoons during 1999. The samples taken at the eastern end of Seadrift Lagoon, showed levels for copper of 12.2-mg/dry kg at the surface and 7.39-mg/dry kg at the bottom. The samples also showed sulfide levels of 22-mg/dry kg at the surface and 3-mg/dry kg at the bottom. The sediments sampled in Bolinas Lagoon showed copper concentrations averaging 9.1-mg/dry kg at the surface and 11.9-mg/dry kg at the bottom and total sulfide concentrations averaging 33.3-mg/dry kg at the surface and 47.7-mg/dry kg at the bottom.

At present, the National Oceanic Atmospheric Administration (NOAA) unofficially uses a value of 34-mg/dry kg as the level of Effects Range-Low (ER-L) for copper concentration in the sediment. Copper concentrations in the sediment below ER-L are not likely to have adverse effects on benthic organisms. The Dredge Material Management Office (ACOE-SF) also unofficially uses 68-mg/dry kg as an "action or review level."<sup>3</sup> When examining dredging projects, any data above that point is considered in the overall risk assessment for a dredging project. Below that level, it is generally ignored. The copper levels the Corps observed in the eastern end of Seadrift Lagoon were lower than both the NOAA (34-mg/dry kg) and DMMO (68-mg/dry kg) numbers.

The Corps does not have any summary data available for totals sulfides, but noted that much higher levels in dredged materials have been observed in studies conducted for the Corps. In those studies total sulfides ranged from over 400 to over 1100 mg/kg and no biological effects were documented. The report stated that sulfides generally have a low toxicity since they are normally bound in an insoluble form as a sulfate with various metals. Furthermore, the DMMO has eliminated total sulfides from the list of analytes since it has not been shown to influence

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<sup>3</sup> The Dredge Materials Management Office is a joint program of the San Francisco Bay Conservation and Development Commission (BCDC), San Francisco Bay Regional Water Quality Control Board (RWQCB), State Lands Commission (SLC), the San Francisco District U.S. Army Corps of Engineers (COE), and the U.S. Environmental Protection Agency (EPA).

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toxicity in dredge material testing.<sup>4</sup> Even though copper sulfate is soluble in water, it binds strongly to sediment. Therefore, its leaching potential is low.

The applicants are proposing activities that would disturb the sediment and may suspend sediments in the water column. As mentioned above, the eastern tide gate, which allows water from Seadrift Lagoon to flow into Bolinas Lagoon, is located approximately one parcel to the northeast of the project site. The proposed development will temporarily suspend sediments in the water column in the area of the project site. Sediments suspended in the water column at a time when the eastern tide gate is open could migrate to Bolinas Lagoon. Although the copper and sulfide levels sampled by the Corps in the eastern end of the Seadrift Lagoon are not especially high, increasing the levels of copper sulfate within Bolinas Lagoon may cause significant adverse effects to water quality, inconsistent with Section 30231. Therefore, to prevent the migration of copper sulfate from Seadrift Lagoon to Bolinas Lagoon, **Special Condition 3** requires that prior to commencement of any construction, the eastern tide gate be closed and remain closed for the duration of construction and for no less than four hours following the completion of construction each day of activities authorized under this permit are carried out.

As proposed, the PVC sheet piles would be topped with a wooden cap, which would be located above the water level (Exhibit 5, Site Plan and Typical Bulkhead Cross Section). The applicants propose to use a wood from natural weather resisting species or possibly treat the wood in accordance with the UC Forest Products Laboratory recommendations. The applicants have not identified how and where the chemicals would be applied to any of the lumber. If the wood were to be treated after installation, the use of wood treatment chemicals over lagoon waters would create an unnecessary risk of adverse impacts due to the potential for accidental spills. Feasible alternatives to treating the wood in-place would be to use pre-treated lumber, or to treat the lumber off site. Therefore to avoid the risk of spilling wood treatment chemicals into lagoon waters, **Special Condition 4** prohibits the use of any wood treatment chemicals within 50 feet of lagoon waters. **Special Condition 4** also requires that treatment products be applied with a brush rather than sprayed to minimize spread of chemicals, and consist only of products approved by the EPA for use in the field.

Once the proposed bulkhead is installed the PVC sheet piles would be exposed to ultra violet radiation. The PVC contains stabilizers that are intended to protect the PVC from degradation which may result from UV exposure. Notwithstanding the protection provided by the stabilizers, the potential does exist that the PVC bulkhead would degrade over time. If the sheet piles were to become brittle, they may splinter upon impact and would introduce PVC debris into the lagoon. PVC debris would cause adverse effects to water quality in Seadrift Lagoon, and may migrate into Bolinas Lagoon and the Pacific Ocean inconsistent with Sections 30230 and 30231. Therefore, to prevent the introduction of PVC debris into coastal waters, **Special Condition 4** requires that prior to issuance of the permit, the applicants submit a Monitoring Plan, acceptable to the Executive Director and that the permittees, and their successors in interest shall be responsible for carrying out all provisions of the Monitoring Plan for as long as the bulkhead remains. **Special Condition 4** requires that the monitoring plan, at a minimum, provide for:

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<sup>4</sup> Analytes are the substances being measured in an analytical procedure.



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- Regular inspections by a licensed engineer, which shall be performed at least every 4 years for the first 12 years after the bulkhead has been installed, and at least every other year thereafter);
- The inspections shall examine the exposed subaerial and submarine portions of the bulkhead (to the mud line) for signs of weakness or possible failure, including, but not limited to cracking, bending, splitting, splintering, or flaking. All weak or potential failure areas should be marked on an as-built plan of the bulkhead, and there should be photographs and text to explain the nature and extent of each weakness;
- Inspection reports shall be prepared and conveyed to the Executive Director within 30 days of the inspection work. These reports shall provide information on and photographs from the date of the inspection, the name and qualifications of the person performing the inspection, and an overall assessment of the continued stability of the bulkhead;
- If the inspection identifies any areas where the bulkhead has been damaged, the permittees shall be responsible for applying for any necessary permits, and performing the work required in compliance with and in accordance with such permits; and
- In the event that any sections of the bulkhead are damaged or flaking, the permittees shall notify the Commission within 10 days; and in such event, within 30 days of such notification, submit to the Commission a complete application for any CDP amendment necessary for the repair or replacement of the bulkhead.

Thus, the proposed project as conditioned will protect the biological productivity and the quality of coastal water and wetlands so as to maintain populations of marine organisms and protect human health of recreational users of these waters by removing creosote treated wood and stopping erosion along the banks of Seadrift Lagoon, as well as preventing impacts to coastal water quality from the migration of contaminated sediments into Bolinas Lagoon and introduction of wood treatment chemicals and PVC marine debris into coastal waters. Therefore, the Commission finds that as conditioned the proposed project is consistent with Sections 30230 and 30231 of the Coastal Act.

### 3.3.2 Visual

Section 30251 states:

*The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

Seadrift Lagoon is part of the Seadrift Sand Spit, which due to its heavily developed state is not considered on its own to be an important coastal visual resource. However, it is adjacent to the highly scenic Bolinas Lagoon. Marin County's Unit I LCP states "to travelers on the highway bordering the Bolinas Lagoon, the outstanding visual elements are the mountains rising on one side and the expanse of the Lagoon itself on the other." It further states that "Seadrift Spit is

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indeed visible here, but it is a low-lying peninsula, which is not the most commanding visual feature of the area.”

Section 30251 of the Coastal Act protects the scenic and visual qualities of coastal areas as a resource of public importance by requiring that permitted development: (1) be sited and designed to protect views to and along the ocean and scenic coastal areas; (2) minimize the alteration of natural land forms; (3) be visually compatible with the character of surrounding areas; and (4) where feasible, restore and enhance visual quality in visually degraded areas. Although Seadrift Spit is not the most prominent visual feature of Bolinas Lagoon, it is still important to ensure that the proposed development does not cause significant adverse visual impacts inconsistent with Section 30251.

The proposed bulkhead would be sited in the exact same location as the existing bulkhead and rise approximately five feet from the bottom of the lagoon. The top of the bulkhead would be level with the existing grade of the applicants’ parcels, and thus, would not block public views to Bolinas Lagoon or the ocean. Furthermore, due to Seadrift Spit’s low-lying topography and existing residential development, the proposed bulkhead would not be visible from any public viewing locations. In fact, the bulkhead would only be visible from inside the gated Seadrift community looking between the residences that encircle the lagoon.

Certain members of the Seadrift Community have expressed concern with the aesthetic qualities of the proposed PVC sheet pile material. However, because the bulkhead is not visible from any public vantage point, the aesthetic qualities of the proposed development are not subject to review under the Coastal Act.

Since the proposed development would not be visible from any public vantage points and would be sited in the exact same location as the existing bulkhead, the top of the bulkhead level with the existing grade of the applicants’ parcels, the Commission finds that the proposed project is consistent with Section 30251 of the Coastal Act.

### 3.4 Hazards

Section 30253 states in relevant part:

*New development shall:*

*Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*

*Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.*

The project site is located approximately a half of a mile east of the active San Andreas Fault Zone. A geotechnical report prepared for another project on Seadrift Lagoon, located at 293 Seadrift Road, states “strong violent ground shaking must be expected at the site from significant seismic activity emanating from this fault zone during the life of the proposed structure” (PGSoils, Inc. 2002). The report concludes that because the area is relatively close to the epicenter of the 1906 earthquake, it is probable that another strong earthquake could occur in the area during the life of the proposed structure at 293 Seadrift Road and that a similar large

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earthquake in the site area could cause significant damage to the proposed structure and its contents (PGSoils, Inc. 2002).

A geotechnical report was not prepared for the proposed project; however, the project site is located approximately one mile from 293 Seadrift Road. Thus, it is logical to conclude that project site would also be subject to the strong to violent ground shaking, which would potentially cause significant damage to the proposed bulkhead. Given the proximity of the site to the San Andreas Fault and the potential for strong to violent shaking to occur as a result of seismic activity, the Commission finds that the subject lot is an inherently hazardous piece of property. Because the applicants propose development on a geologically hazardous site, the Commission imposes **Special Conditions 6** and **7**.

**Special Condition 6** requires the landowner to assume the risks of seismic, geologic, and geotechnical hazards of the property and waive any claim of liability on the part of the Commission. In this way, the applicants are notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicants to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards. The Commission finds that **Special Condition 6** is required because the applicants have voluntarily chosen to implement the project despite the risk of hazards.

**Special Condition 7** requires the applicants to execute and record a deed restriction to ensure that future owners of the property will be informed of the risks, the Commission's immunity from liability, and the indemnity afforded the Commission. Recordation of the deed restriction will also provide notice of potential hazards of the property and eliminate false expectations of potential buyers of the property, lending institutions, and insurance agencies that the property is safe for an indefinite period of time and for further development indefinitely into the future. Therefore, as conditioned, the proposed development minimizes risks to life and property in areas of high geologic hazard and is consistent with Coastal Act Section 30253.

### 3.5 California Environmental Quality Act (CEQA)

Section 13096 of the California Code of Regulations requires Commission approval of Coastal Development Permit applications to be supported by a finding showing the application, as conditioned by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available, which would substantially lessen any significant adverse effects, which the activity may have on the environment.

The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. The staff report addresses and responds to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. The proposed project has been conditioned to be found consistent with the policies of the Coastal Act and to minimize all adverse environmental effects. Mitigation measures have been imposed to prevent impacts to water quality. As conditioned, there are no feasible alternatives or feasible mitigation measures available, beyond those required, which would substantially lessen any significant adverse impacts, which the development may have on the environment. Therefore, the Commission finds that

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the proposed project can be found consistent with Coastal Act requirements to conform to CEQA.

### EXHIBITS:

1. Location map
2. Vicinity map
3. Assessors Parcel Map
4. Site photographs
5. Site plan and typical bulkhead cross section
6. Bulkhead installation plan

### APPENDIX A: SUBSTANTIVE FILE DOCUMENT

Allsopp, Michelle et.al. "Body of Evidence: the effects of chlorine on human health," May 1995.

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(<http://www.ortepa.org/stabilizers/pages/environment.htm>)

National Institutes of Health, National Institute of Environmental Health Sciences, National Toxicology Program's Website  
([http://ntpserver.niehs.nih.gov/htdocs/ARC/ARC\\_KC/Vinyl\\_Chloride.html](http://ntpserver.niehs.nih.gov/htdocs/ARC/ARC_KC/Vinyl_Chloride.html)). "Known Carcinogen: Vinyl Chloride."

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United States Army Corps of Engineers. "Preliminary Analysis the Bolinas Lagoon Study," 1997.

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Personal Communications:

Barbara Kantola, PolyOne Corporation, September 18, 2002.